Assessment of the Potential Costs and Energy Impacts of Spill Prevention, Control, and Countermeasure Requirements for Petroleum Bulk Storage and Distribution Terminals

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Report Prepared for the

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By

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Executive Summary

The purpose of this paper is to provide an assessment of the potential energy impacts arising from compliance costs required for implementation of the 2002 Spill Prevention, Control and Countermeasures (SPCC) rule at petroleum terminals ("tank farms") and petroleum bulk plants and petroleum bulk stations. This paper estimates that the total capital cost to bring petroleum bulk plants and terminals into compliance with the 2002 SPCC regulations could range from **$753 million** to **$4,228 million. Leak detection and tank inspection and integrity testing are estimated to account for about 50 percent of total incremental compliance costs.** Secondary containment costs are estimated to account for 42 percent of the total compliance costs. Estimated average costs for SPCC compliance could range from $30,000 to $96,000 per facility for small petroleum bulk plants, from $84,000 to $209,000 per facility for larger petroleum bulk plants and bulk stations, and from $678,000 to $2.3 million per facility for petroleum terminals. SPCC compliance costs could disproportionately impact smaller petroleum storage and distribution facilities. These increased costs, in combination with other factors, may contribute to consolidation of smaller petroleum suppliers in some regions. The most likely energy impact of the SPCC rule the increased overhead cost of owning a barrel of petroleum storage capacity, a cost that is ultimately passed through to facility customers and consumers in higher petroleum product prices.

SPCC Rule Background

The SPCC rule was first promulgated in 1973 and became effective on January 10, 1974.[1] After three attempts to revise the SPCC rule in the 1990's, the U. S. Environmental Protection Agency (EPA) issued a final rule amending the SPCC regulations in July 2002. The 2002 SPCC rule establishes requirements for non-transportation–related facilities with total aboveground oil storage capacity (in tanks or other oil-filled containers) greater than 1,320 gallons or with buried oil storage tank capacity greater than 42,000 gallons. SPCC-regulated facilities are those that can be reasonably expected to discharge oil into the navigable waters of the United States or adjoining shorelines in the event of a spill.

The 2002 SPCC rule revisions became effective August 16, 2002, but EPA subsequently amended the rule in 2002, 2003 and 2004 to extend the compliance deadline. On December 12, 2005, EPA proposed further amendments to the July 17, 2002 version of the SPCC rule intended to provide regulatory relief for small facilities. On February 10, 2006, EPA extended the compliance date to October 31, 2007 for facilities to revise and implement their SPCC plans. The reason for the current extension is to provide EPA adequate time to take final action on the proposed 2005 amendments to the 2002 rule.

From the perspective of the petroleum bulk terminal sector, minor changes in the language of the 2002 SPCC rule expand the scope of the SPCC requirements:

- The inclusion of the word "use" in Section 112.1 (b),
- The change in applicability from "tanks" to "containers" that "use" or store oil and have a maximum capacity of 55 gallons or more,
- The change in the term "loading rack" to cover "loading and unloading areas."

These changes expand the universe of vessels under the jurisdiction of the 2002 SPCC rule, beyond the storage tanks originally perceived to be the primary focus of the 1974 rule.[2] Equipment and facilities under the jurisdiction of the SPCC rule include:

[1] *(38FR 34164)*

[2] EPA asserts that the 1974 rule was always meant to apply to oil-filled equipment, and that the use of the terms "container" and "use" in the language of the 2002 rule is a clarification of the original intent of the 1974 rule. This is evident from "Appendix C, Summary of Revised SPCC Rule Provisions" in EPA's *SPCC Guidance for Regional Inspectors* published November 28, 2005. In the discussion of minimum container size in the 2002 rule (section 112.1 (d) (5) EPA states that in the 1974 rule "…all

- Aboveground and underground storage tanks
- Piping, control valves and valve pits associated with storage tanks
- Truck Loading racks
- Tank trucks and tank cars parked on petroleum terminal premises
- Terminal-based heavy equipment and service trucks such as fire-fighting equipment, cranes, earthmoving equipment and "cherry pickers"
- Fuel tanks
- Wash racks; Oil/water separators; Waste water and waste oil sumps and tanks
- Oil pipeline to and from marine piers to inland bulk storage terminal
- Pipeline pump station
- Drum storage area
- Electrical transformers

Regulated facilities must maintain SPCC plans, provide SPCC training for personnel, provide secondary containment for regulated storage tanks and oil-filled containers, and provide regular visual inspection and integrity testing of bulk storage containers. A summary of requirements of the 2002 SPCC rule are provided in Attachment 1. Attachment 2 lists proposed 2005 SPCC rule amendments that could apply to some small petroleum storage and distribution facilities.

General Description of the Petroleum Bulk Terminal Sector

Petroleum bulk terminals are a key component of the United States' petroleum distribution system. Petroleum bulk terminals interconnect with and provide storage services to the various modes of crude oil and petroleum product transportation including marine, rail, tank truck and pipeline. Attachment 3 is a schematic diagram of a typical petroleum bulk terminal. This example is the Defense Fuel Support Point Main Terminal in San Pedro, California.

Approximately 1,400 petroleum bulk terminals are operating in the United States, including inland, coastal and marine terminals, and both independent or "third-party" and "proprietary" terminals.[3] Bulk storage of crude oil and petroleum products at terminals is commonly in aboveground steel tanks that range from 50 feet to 200 feet in diameter and may hold several million gallons. More than 500 terminals are estimated to be independent terminals operated by companies that provide bulk petroleum storage and terminal services for a fee. The remaining petroleum terminals are proprietary terminals operated by entities that own the feedstock and products they store, typically refineries and chemical manufacturers. In addition to refineries and chemical plants, operators of proprietary terminals include specialty petroleum product manufacturers and marketers, electric utilities, and defense fuel supply facilities.

The petroleum bulk storage and distribution sector also includes approximately 6400 wholesale petroleum marketers engaged in the bulk sale of petroleum products including automotive and aviation gasoline, diesel fuel, jet fuel, home heating oil, kerosene and lubricating oils.[4] These products are stored at intermediate bulk storage plants, where they are contained in fixed storage tanks or in mobile "skid tanks," prior to transport via truck to smaller local petroleum distributors or end-use customers. The capacity of individual storage tanks at wholesale bulk plants is generally much smaller than tanks at

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containers, regardless of size, were considered to be subject to SPCC provisions." Again, in the discussion of oil-filled equipment in the 2002 rule (section 112.2) EPA states that the language in the 2002 rule is a "clarification on the application of the rule to this type of equipment."

[3] National Petroleum Refiner's Association, NPRA

[4] Petroleum Marketers' Association of American (PMAA) Petroleum Marketers Association, *Update on SPCC Litigation,* memorandum to PMAA members from Dan Gilligan, PMAA President, March 2, 2004.

petroleum terminals, typically ranging from 500 gallons to 6,000 gallons. The total storage capacity at such facilities may be less than 30,000 gallons, with the smallest wholesale bulk plants having less than 10,000 gallons total capacity. Petroleum bulk plants typically have a mix of aboveground and underground storage tanks.[5]

Significant SPCC Compliance Issues for Petroleum Bulk Terminals

The 2002 SPCC rule expands the number and type of petroleum terminal components subject to SPCC regulation. Petroleum bulk storage facilities are explicitly defined in the SPCC rule as non-transportation related facilities under EPA jurisdiction for SPCC requirements. The 2002 SPCC regulations increase the components, mainly oil-filled equipment, included in a SPCC plan and are subject to requirements for secondary containment, visual inspection, integrity testing and external security measures. Stakeholders in the petroleum bulk terminal sector and related industry sectors have raised several issues concerning the application of SPCC requirements to oil-filled operational and oil-filled manufacturing equipment:[6]

- High risk for significant discharges from oil-filled operational equipment to navigable water has not been demonstrated.
- Facility owners/operators of oil-filled operational and manufacturing equipment have strong economic incentives to employ leak detection equipment and rapidly respond to discharge events in order to maintain operations.
- Existing manmade structures such as buildings and diversionary features around oil-filled equipment have value in preventing oil releases to navigable waters, although such structures may not meet the SPCC definition of secondary containment.
- The reportable discharge criterion for exempting oil-filled equipment from secondary containment should be based on the discharge history of the individual oil-filled equipment units, not the facility as a whole. A reportable discharge from unrelated units in a facility is not a valid predictor of the future spill risk from specific oil-filled units at the facility.

The use of the term "loading area" in place of "loading rack" in the 2002 SPCC rule implied that anywhere oil is transferred between a truck and a bulk storage tank requires secondary containment sufficient to hold the contents of the tank truck. This was the subject of litigation and EPA agreed that the term "loading and unloading area" applied only to facilities with loading racks.[7] Although this clarification does not change the requirement for secondary containment at petroleum terminals with loading racks, it potentially benefits small facilities and subsidiary oil loading and unloading points at large facilities.

Concerns were also raised regarding the inclusion of railcars in the 2002 SPCC rule as bulk storage containers during the time that a rail car is simply parked at a petroleum terminal facility. The risk of significant discharge from a parked loaded railcar is viewed as very low due to the strength and construction of a tank car. Shuttling tank cars to and from a secondary containment area in a congested terminal facility is viewed as substantially increasing the risk of collision and subsequent oil discharge.[8]

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[5] Michiel P.H. Bongers, 2000, *Hazardous Materials Storage*, CC Technologies Laboratories, Inc., Dublin, OH.

[6] Examples of industry concerns are provided in the following: Comments of Dow Chemical Company to EPA Docket ID No. EPA-HQ-OPA-2005-001, February 9, 2006; Petroleum Marketers Association of America, Memorandum to PMAA Members Concerning the Settlement of PMAA's lawsuit challenging EPA's 2002 SPCC regulations; Comments of Independent Lubricant Manufacturer's Association (ILMA) to EPA Docket ID No. EPA-HQ-OPA-2005-001; Comments of the American Petroleum Institute (API) to EPA Docket ID No. EPA-HQ-OPA-2005-001.

[7] Memorandum to PMAA Members Concerning the Settlement of PMAA's lawsuit challenging EPA's 2002 SPCC regulations, March 2, 2004

[8] Source: Comments of Dow Chemical Company to EPA Docket ID No. EPA-HQ-OPA-2005-001, February 9, 2006

The complexity of a facility's SPCC Plan is increased by the 2002 rule, which adds to the cost and time required to complete the Plan. The SPCC Plan must include a description of the physical layout of the facility and facility diagram, showing the location and contents of each applicable oil-filled container. The SPCC Plan must note the type of oil in each container and its storage capacity. The SPCC Plan must delineate bulk storage containers, oil-filled manufacturing equipment, and oil-filled operational equipment on the SPCC facility diagram, as well as in the discussion of compliance with the requirements of the SPCC rule. The SPCC Plan must document secondary containment, as well as conformance with inspection and security requirements for each applicable oil-filled container. The Plan must document how equivalent environmental protection is achieved if conformance with the secondary containment requirement is impractical.

Industry stakeholders have recommended eliminating the requirement to list each piece of oil-filled operational and manufacturing equipment in the SPCC Plan and on the Plan facility diagram. This requirement is viewed as a substantial burden for large and complex facilities like large petroleum bulk terminals that provides little or no benefit for spill prevention. A suggested alternative approach is to identify and describe the equipment components comprising a process or storage "unit" and then locate only the "unit" on the facility diagram. Industry stakeholders further recommend that the capacity of oil-filled operational and manufacturing equipment should be based on the working capacity of the equipment, not on the shell capacity or maximum capacity.[9]

The SPCC Plan must be certified by a Professional Engineer. Certification by a professional engineer is required for the SPCC Plan and for demonstrating equivalent environmental protection measures where it is impractical to implement SPCC requirements. Petroleum terminals and bulk plants now incur costs to have a professional engineer on staff or on retainer. Industry stakeholders have commented that, as a practical matter, it may be difficult obtain P.E. certification of equivalent environmental protection measures in lieu of SPCC requirements. This is because, in the absence of precedent confirming that specific equivalent environmental protection measures are acceptable to EPA, professional engineers stake their professional reputations and licenses in certifying SPCC plans with equivalent protection measures.

The 2002 SPPC rule requires regular non-destructive integrity testing of tanks in addition to visual inspection. The 2002 SPCC rule requires petroleum terminal facilities to carefully evaluate all of their operations to identify tanks not already covered under existing testing programs and develop inspection and integrity testing schedules for these tanks.[10] For large, field-assembled bulk storage tanks, this SPCC requirement may already be covered by current tank safety programs and tank safety standards. The main impact of the integrity testing requirement in the 2002 rule is that it covers all bulk storage tanks greater than 1320 gallons. An outcome of the litigation is that shop built tanks of 30,000 gallons or less do not require integrity testing if all sides of the tank are visible and sufficiently accessible to be visually inspected.[11]

New buried pipelines must have cathodic protection and oil pipelines in general must have secondary containment. This requirement of the 2002 SPCC rule has generated objections from the E&P sector concerning the need to provide secondary containment for gathering lines and flow lines at production sites. The EPA 1995 SPCC Survey estimated that 43 percent of piping related to petroleum storage tanks (across all industry sectors) has no corrosion or leak protection. Thirty-five percent of

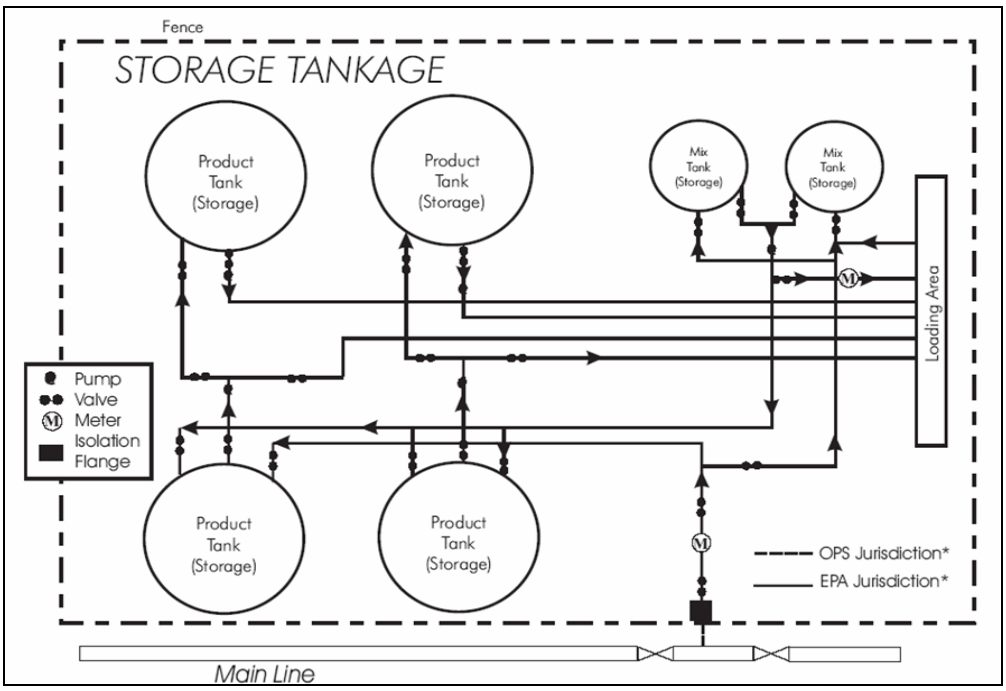
[9] See for example the previously cited comments from API, PMAA and ILMA.
[10] U.S. Environmental Protection Agency, Compliance *Assistance Guidelines: SPCC Requirements and Pollution Prevention Practices for Bulk Storage Facilities*.
[11] Partial settlement of lawsuit brought by the Petroleum Marketer's Association of America (PMAA), Federal Register Vol. 69, No. 101, dated Tuesday May 25, 2004, available from the EPA at http://www.epa.gov/oilspill/pdfs/fr052404.pdf and document entitled "Letter to the Petroleum Marketers Association of America" (PMAA).

piping is painted or asphalt coated; 9 percent has cathodic protection, 12 percent is jacketed or "wrapped" and 3 percent of piping had some other form of external protection.[12]

EPA jurisdiction for SPCC over non-transportation related facilities. EPA has jurisdiction for SPCC over non-transportation related facilities; the Department of Transportation (DOT) and the U.S. Coast Guard have jurisdiction over transportation-related and coastal facilities. In the case of petroleum bulk terminals, the definition of non-transportation-related facilities has been established through a series of Executive Orders and Memoranda of Understanding between EPA and the Department of Transportation (DOT). DOT has jurisdiction over "interstate and intrastate onshore and offshore pipeline systems", whereas EPA has jurisdiction over "oil drilling and production facilities," "industrial, commercial, agricultural and public facilities that use and store oil," and "pipelines used to transport oil within the confines of a non-transportation related facility."

Large petroleum bulk terminals are complex facilities with numerous components. Some petroleum terminal components, particularly breakout and storage tanks and related piping, can be the object of shared jurisdiction among EPA, the U.S. Coast Guard, and the Department of Transportation. EPA's *SPCC Guidance for Regional Inspectors* illustrates some of the complicated issues of regulatory jurisdiction that can arise within petroleum terminals, particularly coastal terminals. In most cases, as shown in Figure 1, EPA has jurisdiction within the fence line of inland terminals and SPCC requirements apply therein.

Figure 1. Example of EPA and DOT Regulatory Jurisdiction Scenario for a Typical Petroleum Bulk Terminal[13]



[12] EPA 1995 SPCC Survey Results as reported in M.P.H. Brongers, 2000, *Hazardous Materials Storage*.
[13] Source: EPA, *SPCC Guidance for Regional Inspectors*, Chapter 2, Attachment 6, November, 2005.

Overview of Analytical Considerations for Compliance Cost Analysis

This report is focused on the potential energy implications of SPCC compliance for the petroleum storage and distribution sector, with particular emphasis on the potential capital cost to bring all facilities into compliance with the 2002 SPCC regulation by the current compliance deadline of October 31, 2007. The following sections present the analytical approach and assumptions used to estimate a range of potential capital costs for SPCC compliance. The final section presents the results and considers the potential energy impacts from this capital outlay by the petroleum storage and distribution sector. Several fundamental considerations must be addressed to estimate compliance costs and the ensuing energy impacts:

- What types of facilities and equipment must comply?
- How many or what portion of facilities are subject to the 2002 SPCC requirements?
- What SPCC requirements apply to each type of facility and what actions must operators take to comply?
- What are the estimated incremental costs associated with compliance including initial compliance costs and recurring or ongoing costs? (*For this analysis, the primary focus will be on initial compliance costs.*)

A "high" compliance cost scenario and a "lower" compliance cost scenario were developed, corresponding to high potential cost impacts and lower potential cost impacts scenarios. Factors that differentiate the cost impacts scenarios include the estimated number of facilities needing to comply with the 2002 SPCC rule, the estimated number of tanks and oil-filled equipment at these facilities, and variability in the cost to implement specific requirements of the rule.

General Logic for Estimating Facilities and Equipment Subject to the 2002 SPCC Rule

The 2002 changes to the SPCC rule result in a number of additional facilities or pieces of equipment included under the rule, beyond the storage tanks originally perceived to be the focus of the 1974 rule. However, not all facilities/ equipment will need to take action to comply. For example:

- Some facilities are already in compliance
- Some facilities are located such that they pose no threat to "navigable waters." (Under EPA's current interpretation of "navigable waters", few petroleum bulk storage facilities are assumed to be exempt from SPCC requirements on the basis of location.)[14]
- Some do not meet the size threshold:
    - For facilities that have total storage capacity of less than 10,000 gallons, the operator is allowed to "self-certify" their SPCC plan. (This analysis assumes that a negligible portion of bulk petroleum plants have a storage capacity less than 10,000 gallons. Consequently, the self-certification provision of the December 12, 2005 proposed rule-making is assumed to have little effect on the petroleum bulk storage and distribution sector.)
    - No individual tank or piece of equipment stores more than 1320 gallons.

Facilities that are not in compliance will need to pursue one or more alternative actions to comply:

- Revise and certify an existing SPCC plan.
- For facilities/ equipment lacking an SPCC plan, some may be incorporated under an existing (revised) SPCC plan and some will require a new SPCC plan.

[14] The June 19, 2006 Supreme Court decision in the joint cases of Rapanos v. United States and Carabell v. U.S. Army Corps of Engineers may change this interpretation, but it is premature at this time to consider the potential impact.

- Some will build new secondary containment around equipment/ tanks not in compliance.
- For some equipment, secondary containment will be impractical and a spill contingency plan will be substituted. The spill contingency plan includes an inspection and maintenance program, spill response plan and a written commitment to provide the necessary spill response resources and trained personnel.
- Some facilities will identify and need to address additional gaps in SPCC compliance, which may include cathodic protection or secondary containment of piping; inspections and integrity testing of tanks and oil-filled equipment; leak testing of pipes and valves, enhanced security measures and SPCC training.
- Some facilities will do nothing because the facility is already in compliance, is smaller than the size threshold, or does not threaten navigable waters.

Therefore, this analysis estimates that a percentage of petroleum storage and distribution facilities will incur costs to implement one or more of the following steps before the October 31, 2007 SPCC compliance deadline:

- Revise an existing SPCC plan.
- Develop a new SPCC plan
- Test existing secondary containment to demonstrate sufficient capacity and imperviousness to oil
- Install new or upgrade secondary containment for tanks and oil-filled equipment
- Install new or upgrade secondary containment for loading/ unloading racks
- Install new secondary containment or cathodic protection for valves and piping
- Demonstrate impracticality for secondary containment and substitute a spill contingency plan
- Conduct initial non-destructive integrity testing of aboveground storage tanks (After the compliance deadline, periodic testing is required on a regular schedule.)
- Install or upgrade tank overfill protection
- Conduct initial leak testing of piping and valves (After the compliance deadline periodic testing is required on a regular schedule.)
- Upgrade site and equipment security measures
- Provide SPCC training for oil-handling personnel

Estimated Facility and Tank/Equipment Count for Petroleum Bulk Plants and Terminals

EPA's 1995 SPCC Survey extrapolated a total facility count of 6,855 for petroleum bulk stations and terminals. [15] From recent industry sources and the U.S. 2002 Economic Census, this analysis estimates a slightly larger number of petroleum bulk storage facilities consisting of approximately 6400 petroleum bulk plants and stations plus approximately 555 to 1400 petroleum terminals. This analysis estimates a facility count in three categories of petroleum bulk plants and terminals:

- "Small" petroleum bulk plants (assumed to have total storage capacity of 42,000 gallons or less)
- "Large" petroleum bulk plants of bulk stations (assumed to have total storage capacity 42,001 to 1,000,000 gallons)
- Petroleum terminals (assumed to have total storage capacity greater than 1 million gallons)

[15] Source: U.S. Environmental Protection Agency, *Regulatory Analysis for the Propose Revisions to the Oil Pollution Prevention Regulation (40 CFR Part 112)*, Office of Solid Waste and Emergency Response, November 2005.

The estimated facility count in each category is based on information from several sources. The 2002 U.S. Economic Census lists 3,001 "Petroleum and Petroleum Product Merchant Wholesalers" (excluding sales and administrative offices) and 3,954 larger establishments called "Petroleum Bulk Stations and Terminals" (again, excluding sales and administrative offices). In comments to the EPA SPCC docket, the Petroleum Marketers Association (PMAA) notes 6,400 "petroleum bulk storage plants" in the U.S. The National Petroleum Refiners Association (NPRA) notes approximately 1,400 petroleum terminals in the U.S. including independent commercial terminals (third-party terminals "for hire") and proprietary terminals owned by refineries, chemical manufacturers and Department of Defense. The Independent Liquid Terminals Association (ILTA) counts approximately 500 U.S plus foreign independent commercial terminal members.

This analysis assumes that the 3,001 Petroleum Product Merchant Wholesalers in the 2002 US Economic Census are equivalent to small petroleum bulk plants. The 3,399 large petroleum bulk plants were estimated by subtracting 3,001 Petroleum Product Merchant Wholesalers from PMAA's count of 6400 petroleum bulk plants (6,400 total petroleum bulk plants – 3,001 est. small bulk plants = 3,399 estimated large bulk plants). Commercial petroleum terminals were estimated by subtracting the estimated 3,399 "large" bulk plants from the 2002 U.S. Economic Census count of 3,954 Petroleum Bulk Stations and Terminals (3,954 petroleum bulk stations and terminals – 3,399 est. large bulk plants = 555 estimated commercial petroleum terminals). Since the estimated 555 commercial petroleum terminals appears to reasonably correspond to the 503 independent terminals represented by the member companies of ILTA, this analysis assumes 555 petroleum terminals in the facility count for the "Lower Impact" SPCC compliance cost scenario and 1400 petroleum terminals (the NPRA estimate) for the "High Impact" SPCC compliance scenario. The estimated facility count for petroleum bulk plants and terminals is summarized in Table 1.

Table 1. Estimated Facility and Equipment Count for Petroleum Bulk Terminal Sector

Facilities & Equipment	Small Petroleum Bulk Plants (assume total capacity <=42,000 gallons)	Large Petroleum Bulk Plants (total capacity 42,001 to 1,000,000 gals.)	Petroleum Bulk Terminals (total capacity >1,000,000 gals.)
High Cost/ Impact Scenario			
Facilities	3,001	3,399	1,400
Tanks/ Equipment[16]	6	20	40
Loading Racks	2	3	10
Lower Cost Impacts Scenario			
Facilities	3,001	3,399	555
Tanks/ Equipment	2	6	30
Loading Racks	1	2	6

The Environmental Protection Agency's 1995 SPCC Survey collected data for a sample of petroleum storage facilities ranging from very large coastal petroleum terminals located at the nation's major ports to smaller regional product distribution facilities. Sixty-six percent of SPCC-regulated petroleum terminal facilities in EPA's analysis were estimated to have total oil storage capacity ranging from 42,000 gallons to 1 million gallons. Twelve percent of petroleum terminal facilities were estimated to have total oil

[16] PTSA (Petroleum Transport & Storage Assoc) Comments to EPA Docket ID No. OPA-2004-0007. Typical petroleum bulk plant will have 2 to 6 fixed tanks and 2 to 6 mobile skid tanks. Typical tank capacity for fixed tanks ranges between 1,000 – 18,000 gallons; AST, shop constructed. Capacity of mobile skid tanks ranges from 500 gallons to 6,000 gallons. ILTA 2006 Membership Directory is source for estimate of tanks/ equipment at petroleum terminals, which varies over a large range from less than 10 tanks to more than 175 tanks. The number of truck loading racks at petroleum terminals range from 1 to10 or more.

storage capacity of more than 1 million gallons. Twenty-two percent of facilities were estimated to have total oil storage capacity of less than 42,000 gallons; nine percent of facilities have total oil storage capacity of less than 10,000 gallons.

For the high cost impacts scenario, this analysis estimates 7,800 total facilities, of which 38 percent are estimated to have total storage capacity of 42,000 gallons or less, 44 percent have total storage capacity between 42,000 gallons and 1 million gallons, and 18 percent have total storage capacity greater than 1 million gallons. For the lower cost impacts scenario the total facility count is estimated to be 6,955 facilities. In this case, 43 percent of facilities have estimated total storage capacity of 42,000 gallons or less, 49 percent have total storage capacity between 42,000 gallons and 1 million gallons, and 8 percent of facilities have total storage capacity of more than 1 million gallons.

Bringing Petroleum Bulk Plants and Terminals into Compliance

As discussed above, the high and low compliance cost or compliance impact scenarios are differentiated by the number of facilities, tanks and equipment assumed to be brought into compliance, as well as by the estimated costs to implement various requirements of the 2002 SPCC rule. The high cost impacts scenario assumes higher costs to implement SPCC compliance actions, a larger number of facilities must be brought fully into compliance with the 2002 SPCC rule, and more tanks and equipment at each facility require compliance actions. The lower cost impacts scenario assumes lower costs to implement SPCC compliance actions, fewer facilities must be brought fully into compliance, and fewer tanks and equipment at facility require compliance actions. The high and lower cost impacts scenarios are intended to bracket a range of potential total SPCC compliance cost impacts for the petroleum bulk plants and terminals sector as a whole. From these high and low estimated total compliance costs, an estimated average per facility compliance cost was extrapolated, which represents the estimated average cost for facilities to meet the final SPCC compliance deadline. The costs are treated as capital costs because the focus is on the one-time capital outlay required for initial compliance. The SPCC rule will require ongoing periodic expenditures to maintain compliance, such as periodic SPCC plan updates following a material change in the facility petroleum storage capacity, regularly scheduled SPCC plan maintenance, and regular tank and equipment inspections and integrity testing.

Table 2 summarizes estimated facility and equipment counts and the assumed percentage of facilities needing to comply with at lease one requirement of the 2002 SPCC rule. The percentage of facilities and equipment needing to comply with the 2002 SPCC rule are estimated based on best professional judgment. There appear to have been few recent efforts to collect data on the current level of compliance with the 2002 SPCC rule.[17] If more concrete data are obtained from relevant industry stakeholders, this analysis will be modified as facility compliance rates and implementation costs are updated.

The assumptions and estimates listed in Table 2 were applied in a spreadsheet to estimate the petroleum bulk plants and terminals still needing to comply with various requirements of the 2002 SPCC rule. For example, Table 2 estimates that for small petroleum bulk plants, 50% are assumed to revise an existing SPCC plan and 45% will require a new plan. Five percent of small petroleum bulk plants are assumed to be exempt from SPCC requirements due to location and lack of threat to navigable waters. For large petroleum bulk plants, 75% of plants are assumed to revise and certify an existing plan and 25% are assumed to require a new SPCC plan. Sixty percent of petroleum terminals are assumed to require a new SPCC plan; 40 % percent of terminals are assumed to revise and certify an existing plan.

[17] One exception is the Maine Department of Environmental Protection which conducted a survey in 2005 of SPCC compliance across multiple industrial and commercial sectors and found 40% percent of facilities surveyed with no SPCC plan.

Table 2. Summary Table of Assumptions for Facility SPCC Compliance for Petroleum Bulk Plants and Terminals

Estimated Affected Facilities	Petroleum Bulk Plants - Small		Petroleum Bulk Plants - Large		Petroleum Terminals	
	Lower Impact	High Impact	Lower Impact	High Impact	Lower Impact	High Impact
No. of Petroleum Bulk Terminals	3,001	3,001	3,399	3,399	555	1,400
Average No. of Tanks/ Equipment per Facility	2	6	6	20	30	40
Average Loading Racks per Facility	1	2	2	3	6	`0
% of Tanks/ Equip Receiving New SPCC Installations or Upgrades	50%	33%	50%	20%	30%	40%
% Facilities revise existing SPCC plans	50%	50%	75%	75%	60%	60%
% Facilities that require new SPCC plans	45%	45%	25%	25%	40%	40%
% Facilities exempt from SPCC requirements	5%	5%	0%	0%	0%	0%
% Facilities substitute spill contingency plan for 2nd containment[18]	5%	5%	5%	5%	10%	5%
% Facilities test existing secondary containment for 80% of tanks/equip.	50%	60%	50%	60%	50%	75%
% Facilities install new secondary containment for x% tanks/equip.	45%	45%	25%	25%	50%	75%
% Facilities install new containment - truck loading racks	50%	60%	50%	50%	50%	75%
% Facilities install new containment/ cathodic protect for valves/ piping	50%	60%	50%	50%	50%	75%
% Facilities that conduct integrity testing of x% tank	50%	60%	50%	50%	50%	100%
% Facilities that install tank overfill prevention at x% of tanks	50%	60%	50%	50%	50%	100%
% Facilities conduct leak testing of valves/ piping	50%	60%	50%	50%	50%	100%
% Facilities upgrade site security measures	50%	60%	25%	25%	50%	50%
% Facilities conduct/ upgrade annual SPCC training	50%	60%	50%	50%	100%	100%

[18] Assumes secondary containment is impractical at x% of tanks and equipment at 5% of facilities.

Following is an example of how the assumptions summarized in Table 2 are used in a spreadsheet to estimate the number of facilities and components that must brought into compliance with SPCC requirements:

Example Calculation to Estimate the Total Potential Cost Impact of Bringing Large Petroleum Bulk Plants into Compliance for Secondary Containment

Lower Impact Scenario Assumptions:

- 25 percent of facilities need to substantially upgrade or install new secondary containment for 50 percent of tanks/equipment; 6 tanks per facility are assumed for the lower impacts scenario
- 3,399 large bulk plants x 0.25 = 850 facilities estimated to need secondary containment
- 850 facilities x 6 tanks per facility x 0.5 = 2,550 tanks estimated to need secondary containment at these facilities

High Impact Scenario Assumptions:

- 25 percent of facilities need to substantially upgrade or install new secondary containment for 20 percent of tanks/equipment; 20 tanks per facility are assumed for the high impact scenario
- 3,399 large bulk plants x 0.25 = 850 facilities estimated to need secondary containment
- 850 facilities x 20 tanks per facility x 0.20 = 3,400 tanks estimated to need secondary containment at these facilities

After the facilities and equipment needing to comply with current SPCC requirements are estimated, the facility and equipment counts are multiplied in a spreadsheet by the estimated costs to implement the various SPCC requirements. Continuing the example above, the cost to install or substantially upgrade secondary containment at a large petroleum bulk plant is estimated to range from $11,000 per tank for the lower impact scenario to $21,000 per tank for the high impact scenario. Thus, the total estimated compliance cost for secondary containment in the lower impact scenario is $28 million, or approximately $33,000 per facility not currently in compliance. Under the high impact scenario the total estimated compliance cost for secondary containment at large bulk plants is $71 million, or approximately $84,000 per facility not currently in compliance.

Estimating Incremental SPCC Compliance Costs

Table 3 summarizes estimated incremental costs to implement various components of the SPCC rule. These cost data were garnered from a variety of sources as indicated in Table 3. Since the focus of this analysis is the cost impact of initial SPCC compliance, the costs in Table 3 are treated as capital costs, initial or “one-time” expenditures to bring a facility into compliance. Facilities will incur several of the cost elements in Table 3 on an on-going basis to maintain SPCC compliance. Future periodic expenditures such as plan updates and inspections and integrity tests will likely be incorporated into a facility operating costs.

Table 4 shows the total estimated SPCC compliance cost components for petroleum bulk plants and terminals. Table 4 is the output from a spreadsheet analysis that multiplies the estimated facility and equipment counts by the estimated incremental cost for each compliance component. Table 4 shows the total estimated cost to implement each SPCC compliance component, from developing a new SPCC plan to installing secondary containment, to providing enhanced security for oil-filled equipment.

The estimated cost for all SPCC compliance components are summed to get a total SPCC compliance cost for each category of facilities in the pipeline terminal sector – small bulk plants, large bulk plants, and petroleum terminals. This total is divided by the estimated number of facilities in each

category to obtain an estimated average SPCC compliance cost per facility in that category. For example, Table 4 shows that for large petroleum bulk plants, the sum of total costs for all SPCC compliance components is $287 million for the lower impacts scenario and $710 million for the high cost scenario. Dividing these totals by the estimated number of large petroleum bulk plants gives an estimated average SPCC compliance cost per large bulk plant ranging from $84,000 (lower cost scenario) to $209,000 (high cost scenario).

Table 3. Estimated Incremental SPCC Compliance Cost Components

Cost Item/Action	Estimated Cost - Low	Estimated Cost - High	Source
Prepare New or Revise Existing SPCC Plan			
Cost to prepare new SPCC plan for small facility, includes PE certification	$5,000	$10,000	US Small Business Admin. Comments to EPA Docket (9/30/03); industry advisement
Cost for SPCC plan; facility w/ 1 – 5 tanks	$10,000	$20,000	Naval Facilities Engineering Service Center, Users Guide for SPCC Regulation, October 2003, UG-2056-Env (NAVFAC Guide); industry advisement
Cost for SPCC plan; facility w/ 5 - 20 tanks	$30,000	$50,000	NAVFAC Guide; industry advisement to scale up $
Cost for SPCC plan; facility w/ 20 - 50 tanks	$50,000	$100,000	NAVFAC Guide; industry advisement to scale up $;
PE certification of existing SPCC plan	$5,000	$10,000	US SBA, Comments to Docket EPA-OPA-2004-0007; Synthetic Organic Chemical Manufacturer's Assoc. Docket 1/7/2003; industry advisement scale
Self certify SPCC or demonstrate exemption	$5,000	$10,000	Estimate & industry advisement
Secondary Containment			
Test imperviousness of existing containment	$1500	$8,000	Ohio Oil and Gas Association , Comments to Docket SPCC-1P-2-58 (12/23/91); industry advisement
New Concrete Berm (2,500 - 5000 gallons)	10,000	$20,000	NAVFAC Guide (scaled up for larger tanks)
Rollover (Drivable) Berm for Loading/ Unloading Areas (1000 - 5,000 gallons)	$5,000	$12,000	NAVFAC Guide
Cost to retrofit existing containment to be fully impervious to oil	$20,000	$25,000	OOOGA , Comments to Docket SPCC-1P-2-58 (12/23/91); industry advisement to scale up $
Containment Area Drains & Sump Pumps	$1,000	$1,000	NAVFAC Guide
Doorway Spill Barriers	$3,000	$11,000	NAVFAC Guide
Portable Containment Berms	$3,000	$7,000	NAVFAC Guide
Install tank linings, large tanks per site	$50,000	$50,000	Sioux Falls, SD; Williams Energy Partners, LP, 2002 Ann. Rpt., $300,000 (est. 6 tanks @ $50,000 per tank); industry advisement
Leak Testing, Inspection, Spill Contingency Planning			
Leak Testing of Valves & Piping, per pipe segment	$200	$1,000	NAVFAC Guide
Annual Leak Testing ,Valves & Piping, per facility	$2,000	$20,000	NAVFAC Guide, depends on length of piping system & detection method
Install permanent release detection system for underground pipe systems	$40,000	$1,000,000	NAVFAC Guide, Depends on size of facility
Spill clean up and drain protection systems	$1,000	$3,000	estimate, NAVFAC Guide, Depends on size of spill & complexity of facility, range is $800 - $10,000
Tank Integrity Test, brittle fracture eval., per tank	$10,000	$12,000	NAVFAC Guide, assumes a 20,000 gallon steel AST
Tank Integrity Testing, 1320 gal - 10,000 gal, per tank	$2,500	$5,000	U.S. EPA *Regulatory Analysis for the Proposed Revisions to Oil Pollution Prevention Regulation (40 CFR Part 112),* November 2005 (US EPA, 2005)
Tank Integrity Testing, 10,001 - 42,000 gal, per tank	$10,000	$25,000	US EPA, 2005
Tank Integrity Test., 42,000 - 1,000,000 gal, per tank	$25,000	$50,000	US EPA, 2005
Tank Integrity Testing, >1,000,000, per tank	$50,000	$75,000	US EPA, 2005
Inspection of AST tank bottoms (large AST, 100' dia.)	$30,000	$50,000	M. P.H. Brongers, 2000, *Hazardous Materials Storage,* CC Technologies Laboratories, Inc., Dublin, OH
Replace AST Tank Bottom	$200,000	$500,000	M. P.H. Brongers, 2000, Hazardous Materials Storage, CC Technologies Laboratories, Inc., Dublin, OH
Security and Training			
Valve Lockouts, each	$75	$100	NAVFAC Guide
Fencing, linear foot, includes gates & fence posts	$25	$50	NAVFAC Guide
Install area lighting on poles (1or 2 fixtures per pole), per pole	$4,000	$5,000	NAVFAC Guide

Employee SPCC training	$2,000	$4,000	Estimate for larger facilities
Employee SPCC training	$1,000	$2,000	Estimate for smaller facilities
Overfill Protection			
Overfill Prevention Warning Signs	$150	$150	NAVFAC Guide
Liquid Level Sensing Device	$200	$1,000	NAVFAC Guide, per tank
Liquid Level Sensing Devices w/ Alarms, simple	$4,000	$5,000	NAVFAC Guide, per installation (not per tank)
Liquid Level Sensing, Alarm & Shut Off, fully automated	$12,500	$18,000	NAVFAC Guide, per installation (not per tank)
Corrosion Protection			
Internal lining for 10,000 gallon tank	$48,000	$48,000	M. P.H. Brongers, 2000, *Hazardous Materials Storage,* CC Technologies Laboratories, Inc., Dublin, OH
External coating for 10,000 gallon tank (reapply every 5 years)	$6,000	$6,000	M. P.H. Brongers, 2000, *Hazardous Materials Storage,* CC Technologies Laboratories, Inc., Dublin, OH
Installation of Impressed-Current Cathodic Protection for 100' dia. aboveground tank	$17,000	$17,000	M. P.H. Brongers, 2000, *Hazardous Materials Storage,* CC Technologies Laboratories, Inc., Dublin, OH
Annual Cost of Impressed Current Cathodic Protection (includes depreciation, electric power, annual & bimonthly inspection)	$1,800	$1,800	M. P.H. Brongers, 2000, *Hazardous Materials Storage,* CC Technologies Laboratories, Inc., Dublin, OH

Table 4. Potential SPCC Compliance Cost Components for Petroleum Bulk Plants and Terminals – 2002 SPCC Rule

Compliance Action	Petroleum Bulk Plants -Small				Petroleum Bulk Plants - Large				Large Petroleum Storage Terminals			
	High Impact		Lower Impact		High Impact		Lower Impact		High Impact		Lower Impact	
	# Facilities	Cost	# Facilities	Cost	# Facilities	Cost	# Facilities	Cost	# Facilities	Cost	# Facilities	Cost
SPCC Plans												
Revise & PE Certify Existing SPCC Plan	1501	$30,010,000	1501	$ 7,502,500	2549	$50,985,000	2549	$12,746,250	840	$42,000,000	333	$16,650,000
Develop New SPCC Plan and PE Certify	1350	$13,504,500	1350	$ 6,752,250	850	$42,487,500	850	$25,492,500	560	$56,000,000	222	$22,200,000
Exempt from SPCC due to location	150	$1,500,500	150	$ 750,250	0		0		0		0	
Subtotal/ SPCC Plan Estimated Cost	**3,001**	**$45,015,000**	**3,001**	**$ 15,005,000**	**3,399**	**$93,472,500**	**3,399**	**$38,238,750**	**1400**	**$98,000,000**	**555**	**$38,850,000**
Secondary Containment												
Test Exisiting Secondary Containment	1801	$12,964,320	1501	$3,601,200	2039	$48,945,600	1700	$12,236,400	1050	$50,400,000	278	$9,990,000
Install New Containment or Upgrade - Tanks	1350	$ 56,662,181	1350	$ 14,854,950	850	$ 71,379,000	850	$ 28,041,750	1050	$ 840,000,000	278	$ 124,875,000
Spill Contingency Measures; 2nd Containment Impractical	150	$ 2,997,999	150	$ 600,200	170	$ 6,798,000	170	$ 2,039,400	70	$ 11,200,000	56	$ 1,998,000
Install New Containment or Upgrade - Loading Racks	1801	$14,404,800	1501	$6,002,000	1700	$20,394,000	1700	$13,596,000	1050	$68,250,000	278	$4,995,000
Install New Contaiin. or Cathodic Protect - Valves/ Piping	1801	$75,549,575	1501	$16,505,500	1700	$57,783,000	1700	$21,668,625	1050	$285,600,000	278	$42,457,500
Install New Tank Overfill Protection	1801	$4,137,239	1501	$525,175	1700	$35,009,700	1700	$21,158,775	1400	$112,000,000	278	$9,990,000
Secondary Containment Estimated Cost		**$166,716,114**		**$42,089,025**		**$240,309,300**		**$98,740,950**		**$1,367,450,000**		**$194,305,500**
Leak & Integrity Test												
Leak Test Valves & Piping	1801	$3,601,200	1501	$3,001,000	1700	$3,399,000	1700	$3,399,000	1400	$28,000,000	278	$5,550,000
Periodic Tank Integrity Test	1801	$43,171,186	1501	$15,005,000	1700	$339,900,000	1700	$127,462,500	1400	$1,680,000,000	278	$124,875,000
Leak & Integrity Test Estimated Cost		**$46,772,386**		**$18,006,000**		**$343,299,000**		**$130,861,500**		**$1,708,000,000**		**$130,425,000**
Security Measures												
Assume 1000' of fencing, 4 lights, 10 valve locks									700	$49,560,000	278	$11,433,000
Assume 400' of fencing, 2 lights, 4 valve locks					850	$25,832,400	850	$15,380,475				
Assume 200' of fencing, 1 light, 2 valve locks	1801	$27,369,120	1501	$13,579,525								
Annual Employee SPCC Training	1801	$3,601,200	1501	$1,500,500	1700	$6,798,000	1700	$3,399,000	1400	$5,600,000	555	$1,110,000
Security Measures Estimated Cost		**$30,970,320**		**$15,080,025**		**$32,630,400**		**$18,779,475**		**$55,160,000**		**$12,543,000**
SPCC Compliance - Total Cost		**$289,473,819**		**$ 90,180,050**		**$ 709,711,200**		**$ 286,620,675**		**$3,228,610,000**		**$ 376,123,500**
Estimated Average Capital Cost per Facility		**$96,459**		**$30,050**		**$ 208,800**		**$ 84,325**		**$ 2,306,150**		**$ 677,700**

Estimated SPCC Compliance Costs for Petroleum Bulk Plants and Terminals

A range of SPCC compliance costs estimated for the petroleum bulk terminal sector is summarized in Table 5. The total incremental capital cost to bring the entire petroleum bulk plants and terminal sector into compliance with the 2002 SPCC rule is estimated to range from **$753 million** to **$4,228 million**. The total compliance cost for **small petroleum bulk plants** is estimated to range from **$90 million to $289 million**. For **large petroleum bulk plants**, the total estimated compliance cost ranges from **$287 million to $710 million**. For **petroleum terminals**, the total estimated cost for SPCC compliance ranges from **$379 million to $3,229 million**. Table 4 provides additional detail, showing estimated total costs for SPCC plans, secondary containment, leak and integrity testing and enhanced security for facilities and equipment at small and large petroleum bulk plants and petroleum terminals.

Table 5. Summary of Estimated Total SPCC Compliance Costs for the Petroleum Terminals and Bulk Storage Sector (Capital Cost to Implement by the Compliance Deadline)

	High Cost/ Impact ($ million)	Lower Cost/ Impact ($ million)
Total SPCC Compliance Cost – All Petroleum Terminals	**$ 4,228**	**$ 753**
Petroleum Bulk Plants – Small (<42,000 gals.)	$ 289	$ 90
Petroleum Bulk Plants – Large (42,000 – 1,000,000 gals.)	$ 710	$ 287
Petroleum Terminals (1,000,000 gals.)	$3,229	$ 376
	($)	($)
Average SPCC Compliance Cost per Facility ($/site)	**$ 542,000**	**$ 108,000**
Average Cost per Site – Small Petroleum Bulk Plants ($/site)	$ 96,000	$ 30,000
Average Cost per Site – Large Petroleum Bulk Plants ($/site)	$ 209,000	$ 84,000
Average Cost per Site – Petroleum Terminals ($/site)	$ 2,310 million	$ 678,000

Table 6 lists the total SPCC compliance costs for the major categories of SPCC compliance actions: the SPCC plan; secondary containment of tanks and equipment; leak detection; and enhanced security measures. These categories are listed in Table 6 in order from potentially the most costly to potentially the least costly:

- Leak detection and integrity testing
- Secondary containment
- SPCC Plan
- Security measures

For the high cost scenario, leak detection and tank & integrity testing is estimated to contribute 50 percent of the total SPCC compliance cost for the petroleum bulk plants and terminals sector. Secondary containment is estimated to contribute 42 percent of total compliance costs. SPCC plans account for 5 percent and enhanced security measures account for 3 percent of total compliance costs. For the lower cost scenario, secondary containment is estimated to contribute 45 percent of the total SPCC compliance cost for the petroleum bulk plants and terminals sector. Leak detection, tank inspection and tank integrity testing measures contribute approximately 37 percent of total compliance costs. SPCC plans are estimated to contribute approximately 12 percent of the total SPCC compliance costs, and enhance security accounts for 6 percent of total compliance costs.

Table 6. Summary of Estimated Total SPCC Compliance Costs by Compliance Component for the Petroleum Terminals and Bulk Storage Sector

SPCC Compliance Cost Component	High Cost/ Impact ($ million)	Lower Cost/ Impact ($ million)
Leak Detection, Inspection & Integrity Testing		
Total Leak Detection and Testing Cost – All Facilities	**$ 2,098**	**$ 279**
Petroleum Bulk Plants – **Small**	$ 47	$ 18
Petroleum Bulk Plants – **Large**	$ 343	$ 131
Petroleum **Terminals**	$ 1,708	$ 130
Secondary Containment		
Total Secondary Containment Cost – All Facilities	**$ 1,774**	**$ 335**
Petroleum Bulk Plants – **Small** (<42,000 gals.)	$ 167	$ 42
Petroleum Bulk Plants – **Large** (42,000 – 1,000,000 gals.)	$ 240	$ 99
Petroleum **Terminals** (1,000,000 gals.)	$ 1,367	$ 194
SPCC Plans		
Total SPCC Plans – All Facilities	**$ 236**	**$ 92**
Petroleum Bulk Plants – **Small**	$ 45	$ 15
Petroleum Bulk Plants – **Large**	$ 93	$ 38
Petroleum **Terminals**	$ 98	$ 39
Enhanced Security, Training		
Total Security, Training Cost – All Facilities	**$ 119**	**$ 47**
Petroleum Bulk Plants – **Small**	$ 31	$15
Petroleum Bulk Plants – **Large**	$ 33	$ 19
Petroleum **Terminals**	$ 55	$ 13

Sources of Uncertainty in Compliance Cost Analysis

It is important to bear in mind that this compliance cost analysis is an initial estimate of the potential magnitude of the cost to bring all petroleum terminals and bulk storage facilities into compliance with the 2002 SPCC requirements, as well as an initial estimate of the potential range of compliance costs that individual facilities might face. There are uncertainties throughout with regard to the number and size of facilities, the percentage of facilities that are already in compliance, actual compliance costs, and the configuration of tanks and equipment at individual facilities. This analysis is intended as a starting point for discussion with industry stakeholders, in the hope that new, sector-specific, facility-specific or company-specific data can be gained, from which the costs and assumptions presented here can be modified to provide the best possible understanding of the impacts of the 2002 SPCC rule on the petroleum storage sector.

While there is uncertainty around all the inputs to this analysis, key sources of uncertainty include the following:

- Facilities Count and Facilities Characterization – An accurate count of total facilities is needed, as well as an accurate breakdown of petroleum bulk storage into categories of small capacity bulk plants, large capacity bulk plants, and petroleum terminals.
- Facilities Already in Compliance – The percentage of facilities already in compliance and the percentage that have yet to fully comply with SPCC are major drivers of the results of this analysis. These percentages are assumed.

- Characterization of Tanks and Oil-filled Equipment at Individual Facilities - A better understanding of the numbers of tanks and equipment under SPCC requirements at individual facilities is needed. This is a key driver of the results of this analysis.
- Incremental Compliance Cost – Potential compliance costs have been assembled from a variety of sources, but could be improved. Industry advisement from the petroleum terminals and petroleum marketing sectors have improved the cost estimates by providing ranges of typical and reasonable costs for several SPCC compliance elements, as well as advice used to "scale up" some of the costs obtained from the NAVFAC source.

Potential Energy Impacts of SPCC Compliance for Petroleum Bulk Plants and Terminals

There are two ways to consider the potential energy impacts of SPCC compliance for the petroleum bulk terminal sector. One can consider the potential capital outlay needed for individual facilities to meet the current SPCC compliance deadline and the potential impact on the viability of individual facilities and companies. Alternatively, one can compare the total compliance cost to sector-wide metrics such as total product throughput and total revenues to estimate the relative magnitude of impact that SPCC regulation might have on the price and availability of petroleum products.

While the total estimated costs of SPCC compliance are very high when aggregated on a national scale, no operators of large petroleum terminals are likely to be put out of business by SPCC compliance requirements. Instead, SPCC compliance requirements add to the overhead cost to "own" a barrel of petroleum storage capacity, which are passed through to terminal customers, and ultimately to the consumers of petroleum products, in higher product prices. The terminaling of crude oil and petroleum products and wholesale distribution of products is such a large industry that the potential impacts of SPCC compliance costs on product prices become diluted. Nevertheless, it can be easy to overlook the possibility that cumulative costs of SPCC compliance at multiple facilities may be significant for individual companies. An example of cumulative SPCC compliance impacts is provided by the Williams Energy Partners *2002 Annual Report* in which Williams Pipeline Company reports paying $1.6 million to install dike linings and $300,000 to install breakout tank linings, and anticipates the need to revise 100 SPCC plans at pipeline and terminal facilities.[19] While the SPCC compliance costs for any one facility may not seem unduly high, these costs add up quickly for companies with multiple facilities. SPCC compliance costs of $2.4 million were absorbed by Williams Pipeline Company during 2002. This is apparently a fairly typical annual expenditure for SPCC compliance; the Independent Liquid Terminal Association (ILTA) offered anecdotal information that large petroleum terminals with total storage capacity of 10 - 30 million gallons typically spend $1 million to $3 million per year to comply with SPCC requirements. [20]

Public comments regarding the 2002 SPCC rule and the proposed 2005 amendments suggest that regionally or locally significant energy impacts might arise from the cost impacts on smaller operators of petroleum bulk plants, such as local wholesale fuel distributors and distributors of specialty petroleum products. Increasing environmental costs, combined with other regulations and rising real estate cost, potentially squeezes smaller terminal operations and bulk plants, which may exacerbate an on-going trend of consolidation of petroleum bulk storage operations. While industry stakeholders acknowledge that industry consolidation could push individual facilities out of business, there does not appear to be agreement that this phenomenon would negatively impact local or regional petroleum distribution systems by contributing to increased supply vulnerability and price volatility.

[19] Williams Energy Partners, L.P., *2002 Annual Report*
[20] Independent Liquid Terminal Association, personal communication to Robin Petrusak, Advanced Resources International, August 2006.

The potential for SPCC compliance costs to disproportionately impact small operators is illustrated by Table 5. The estimated average cost to bring small petroleum bulk plants into compliance ranges from $30,000 to $96,000 per facility. If the average capacity of these facilities is assumed to be approximately 30,000 gallons, then the estimated SPCC compliance cost ranges from $1.00 per gallon to more than $3.00 per gallon of capacity. The estimated average cost to bring large petroleum bulk plants and stations into compliance ranges from $84,000 to $209,000 per facility. If the average capacity of these facilities is assumed to be 500,000 gallons, then the estimated SPCC compliance cost ranges from $0.17 per gallon to $0.42 per gallon of capacity owned. For petroleum terminals the estimated average cost to comply with the 2002 SPCC regulations is estimated to range from $678,000 to $2.3 million per facility. If the average capacity of these terminals is assumed to be 10 million gallons, the estimated SPCC compliance cost ranges from $0.07 per gallon to $0.23 per gallon.

In 2002, U.S. domestic crude oil production was 2.1 billion barrels, crude oil imports were 4.2 billion barrels, and total finished petroleum products supplied were 6.4 billion barrels.[21] Total sales for petroleum merchant wholesalers and petroleum bulk stations and terminals were $208.2 billion in 2002.[22] If all crude oil and petroleum products supplied in 2002 were assumed to have passed through petroleum bulk storage at least once, the estimated revenue generated from petroleum bulk storage was $16.39 per barrel or $0.39 per gallon. For 2005, the total of crude oil production and imports plus finished petroleum products increased to 13.6 billion barrels.[23] Estimated total SPCC compliance costs range from $753 million to $4,228 million or $0.06 to $0.31 per barrel of crude oil and petroleum product supplied. Thus, the estimated cost for SPCC compliance represents approximately 0.37 percent to 1.8 percent of total sales for petroleum terminals and bulk plants. When viewed in this manner, on a national scale and in isolation from other environmental compliance costs and external factors, the potential cost of SPCC compliance for the petroleum storage and distribution sector likely adds a few cents per barrel to the cost of crude oil and less than a penny per gallon of finished petroleum products.

[21] U.S. Energy Information Administration
[22] Source: U.S. 2002 Economic Census.
[23] U.S. Energy Information Administration: domestic crude production = 1.9 billion barrels; crude oil imports = 4.9 billion barrels; finished petroleum products supplied = 6.8 billion barrels.

List of Attachments

Attachment 1

Key Features of the 2002 SPCC Rule of Relevance to Petroleum Bulk Terminals

The 2002 SPCC rule expands both the scope and requirements of the original 1974 SPCC rule, which has generated confusion, controversy and recommendations to change the rule. The implementation of the final rule is now pushed forward to October 31, 2007, more than five years beyond the original implementation date of August 16, 2002. This section briefly describes key features of the 2002 SPCC rule that are likely to be relevant to petroleum bulk terminals.

The universe of oil-filled vessels covered by SPCC requirements has expanded to include small tanks, drums and oil-filled equipment.

- The 2002 SPCC requirements apply to "containers" that "use" or store oil and have a maximum or 'shell' capacity of 55 gallons or more.
- Oil-filled operational and manufacturing equipment are now included, in addition to petroleum storage tanks, which were the primary focus of the 1974 rule. Newly regulated oil-filled "containers" include process vessels, gathering lines, sumps, pipelines, tank trucks, oil-filled "motive" power equipment, and non-motive oil-filled equipment such as compressors, oil-water separators, and electrical transformers and tank trucks.
- Containers less than 55 gallons are exempt from SPCC requirements. Other exempt containers include:
    - Containers that use or store oil having a shell capacity less than 55 gallons
    - Storage tanks and containers used exclusively for wastewater treatment
    - Completely buried storage tanks and associated piping with less than 42,000 gallons capacity and loading racks associated with exempt underground storage tanks
    - Permanently-closed aboveground storage tanks
    - Pipelines, tanks, loading racks, and other facilities already regulated by the Department of Interior, the Department of Transportation, or the U.S. Coast Guard.

Spill reporting, SPCC Plans and training requirements

- The discharge reporting threshold is 1000 gallons or two spills over 42 gallons within one year, or a discharge of any size that produces a visible sheen of waters of the U.S.
- The review frequency of SPCC Plans is extended from 3 to 5 years and SPCC Plans can be integrated with emergency plans or use non-standard formats.
- The SPCC Plan must be amended whenever there is a change in the facility that "materially affects the facility's potential for the discharge of oil into or upon the navigable waters of the United States…" Examples of a material change include the commissioning or decommissioning of new storage tanks.
- The 2002 SPCC Plan requirements are more detailed and comprehensive, requiring detailed facility drawings; the location and description of all oil-filled containers; oil handling/emergency procedures; discussion of SPCC compliance for each subject container or an explanation of equivalent environmental protection; waste disposal options; and emergency notification list, etc. Historical spill information is no longer required in the SPCC Plan.
- Training is required for "oil-handling personnel" only and must include "discharge briefings" at least once a year.

Secondary Containment and Integrity Testing of Storage Containers[24]

- Secondary containment such as dikes, berms, curbing, liners, drainage and catchment areas are required for all equipment and tanks that contain 55 gallons or more of oil. This includes process equipment and piping, flowlines, pumps, process tanks, separators and engine crankcases, as well as storage tanks.
- The secondary containment must be "sufficiently impervious" to contain the oil until it can be cleaned up.
- Secondary containment can be waived on the basis of technical impracticality, not economic impracticality, but must be replaced with a spill contingency plan and regular integrity testing and visual inspection.
- New buried piping must be coated, wrapped and provided with cathodic protection protected or, must otherwise fulfill federal pipeline standards.
- Bulk storage containers are required to be tested both visually and with another non-destructive testing technique such as hydrostatic testing, radiographic testing, ultrasonic testing, or acoustic testing. The non-destructive testing must be conducted on a regular schedule, or whenever the storage container is undergoing repair.

Requirements for Bulk Storage Containers and Loading/ Unloading Racks

- Secondary containment must be provided for loading racks sufficient to hold the maximum capacity of any tank car or tank truck.
- Locks, warning system or alarms must be provided to prevent the overfilling of tanks or the disconnection of the oil transfer lines at loading/ unloading racks.
- Bulk storage tanks must be equipped with high liquid level alarms and pump "cut off" devices for storage tanks
- Secondary containment or an alternative drainage catchment system must be provided for all bulk storage tanks sufficient to hold the capacity of the tank plus precipitation.
- Regular leak tests are required for buried tanks and pipelines, plus cathodic protection.

Security

- Facilities must be fenced, lighted and locked or guarded to prevent vandalism.
- Various switch guards, covers and locks are required for oil-filled operational and manufacturing equipment such as pumps and pipe valves

Definition of Facility and Clarification of Regulatory Jurisdictions

- The 2002 SPCC Rule provides clarification of the applicability of SPCC requirements including definitions of a "facility" and the universe of "non-transportation-related" facilities.
- The 2002 SPCC rule further describes the different jurisdictions of federal agencies for regulating oil-filled equipment and containers.

[24] The EPA 1995 SPCC Survey examined oil spills attributable to aboveground and underground storage tanks. Material failure of some part of a tank (weld/joint, tank bottom, tank roof, tank piping, etc) caused 19 percent of the spills. Damage from loading arms, loading racks, etc caused 12 percent of spills and valves, pumps and other equipment caused 39 percent of spills. The remaining 30 percent of spills had other causes. (From EPA 1995 SPCC Survey results as reported in Brongers, 2000.)

Attachment 2

Proposed 2005 SPCC Rule Amendments that Potentially Impact Petroleum Terminals

EPA proposed the 2005 SPCC rule amendments to reduce the compliance burden on small facilities and to address other concerns raised by stakeholders. Petroleum bulk terminals range in size, but most are large, complex facilities subject to multiple overlapping safety and environmental regulations. Some of the proposed SPCC amendments may offer regulatory relief to petroleum bulk terminals, but this can not be quantified with out substantial detailed information about terminal operations and the current state of compliance with the 2002 SPCC rule. This is an area for further investigation.

2005 SPCC rule amendments reduce SPCC compliance requirements for qualified small facilities.

- This amendment is intended to provide relief to small facilities such as smaller farms, small commercial enterprises and marginal oil and gas wells, having total oil storage capacity of 10,000 gallons or less. This amendment is unlikely to significantly impact petroleum bulk terminals because only nine percent of terminal facilities are estimated to have total oil storage capacity of less than 10,000 gallons.
- This amendment allows owner-operators of a qualified facility to self-certify the facility's SPCC plan rather than require certification by a licensed Professional Engineer. A qualified facility is defined as having aggregate facility storage capacity of 10,000 gallons or less, and no reportable discharges during the ten years prior to self-certification or since becoming subject to SPCC requirements.
- Self-certified facilities are permitted some flexibility in meeting facility security requirements and integrity testing of bulk storage containers, such as relying on visual inspection alone or industry-standards for steel tank integrity testing.

Alternatives to sized secondary containment for oil-filled operational equipment.

- This amendment offers an alternative to secondary containment requirements for qualified oil-filled operational equipment. The alternative approach substitutes an oil-spill contingency plan and a written commitment of manpower, equipment and materials needed to contain and clean up an oil discharge.
- This amendment might provide significant relief to petroleum bulk terminals if oil-filled operational equipment is exempt from secondary containment. Additional relief might be provided if a terminal's Facility Response Plan can also fulfill the requirement for an oil-spill contingency plan and written commitment of manpower, material and equipment.
- The alternative oil spill contingency plan does not require the facility to first receive an impracticality determination for secondary containment.
- Facilities can exercise this alternative if there have been no reportable discharges from oil-filled operational equipment in the preceding 10 years or since becoming subject to SPCC regulations.

"Motive Power" containers (fuel tanks) greater than 55 gallons are exempt from SPCC requirements.

- This amendment clarifies that the 2002 SPCC rule was not meant to apply to on-board fuel tanks on buses, sport utility vehicles, aircraft, commercial trucks, mining equipment, seismic vehicles

and refinery vehicle fuel tanks. In addition, airport mobile refuelers are exempt from secondary containment requirements.

- This amendment benefits petroleum bulk terminals due to the significant number of tank trucks that enter and exit a petroleum terminal each day and spend a portion of time temporarily parked or otherwise immobile at the facility. The fuel tanks and engine lubricants in these vehicles are not subject to the SPCC rule.
- The risk of a significant spill from onboard vehicle fuel tanks is considered to be very low. Consequently, industry stakeholders have recommended that the motive power exemption be expanded to include all construction equipment and utility vehicles operating at a petroleum terminal.

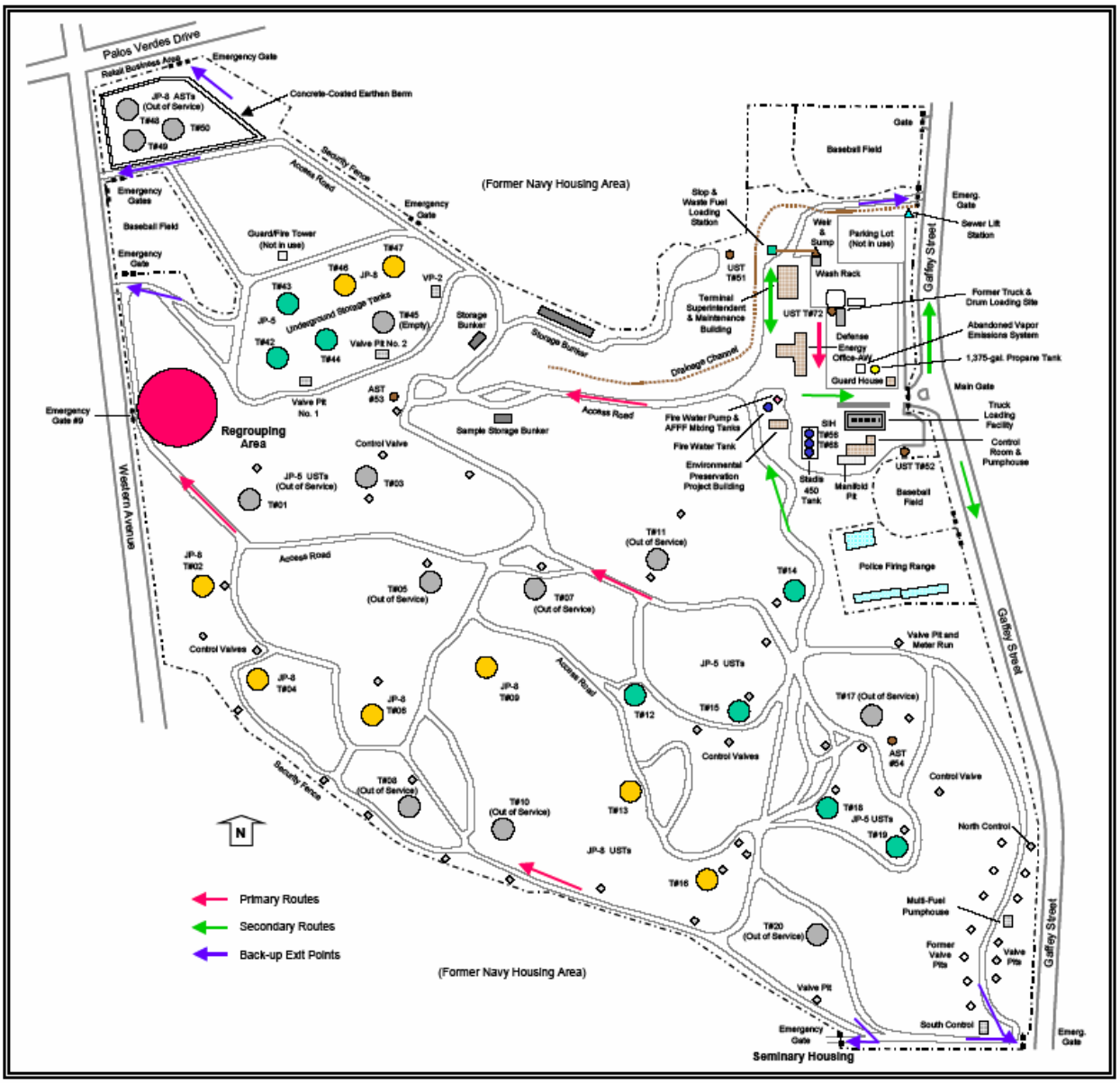
Alternative to integrity testing for shop-fabricated tanks with capacity less than 30,000 gallons.

- The 2002 SPCC rule requires regularly scheduled visual inspection and integrity testing of aboveground tanks. The proposed amendment does not require integrity testing for shop-fabricated tanks of 30,000 gallons or less provided all four sides of the tank are visible and can be visually inspected.
- The amendment may offer some relief to petroleum bulk terminals for SPCC-regulated tanks that generally meet the size and configuration requirements. The potential number of petroleum terminal tanks that could possibly be affected remains to be determined. EPA estimates that fewer than 21 percent of petroleum terminal tanks would be covered by this amendment.[25]
- Tanks that have a synthetic liner on the bottom do not require integrity testing even if the tank is not elevated off the ground.
- Tanks that rest on bare ground continue to be of concern for corrosion and leakage and will still require integrity testing.

[25] Source: U.S. Environmental Protection Agency, *Regulatory Analysis for the Proposed Revisions to the Oil Pollution Prevention Regulation (40 CFR Part 112*), Office of Solid Waste and Emergency Response, November 2005.

Attachment 3

Schematic Illustration of the Defense Fuel Support Point Main Terminal, San Pedro, California[26]



[26] Defense Fuel Support Point, San Pedro, California, Oil and Hazardous Substances Integrated Contingency Plan, October 21, 2002